

# SOUTHWESTERN NEWS

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## UT SOUTHWESTERN AWARDED \$4.5 MILLION FEDERAL GRANT TO DEVELOP ANTIBIOLOGICAL WARFARE VACCINES

DALLAS — April 4, 1997 — Scientists at UT Southwestern Medical Center at Dallas who developed technology that could revolutionize immunizations have been awarded a \$4.5 million federal grant to apply that technology to counter biological warfare.

The Defense Advanced Research Projects Agency (DARPA), the central research and development organization for the Department of Defense, is awarding a total of \$30 million to about a dozen institutions to develop pathogen countermeasures in response to the growing threat of biological warfare.

The UT Southwestern research will be led by Dr. Stephen Johnston, a professor of internal medicine and biochemistry. Johnston was the first to demonstrate genetic immunization in 1992 following his development of a "gene gun," which enabled genes coated onto microprojectiles and shot directly into the cells of animals to be expressed. This delivery of antigen genes provokes an immune response. He later pioneered a revolutionary method of vaccine development called expression library immunization, in which vaccines for any animal or human pathogen can be discovered by shooting all the genomic bits of a pathogen into an organism.

The DARPA-funded research in Johnston's lab will have four focuses:

- \* Optimal cell targeting: making more effective and faster acting vaccines by delivering them directly to the cells that drive the immune system.
- \* Very fast vaccines: using genome sequencing technology to develop a vaccine in one day.
- \* "On/off vaccines": developing vaccines that could be boosted by taking a drug.
- \* Vaccines against anything: manufacturing vaccines against anything, which would use the genome technology to produce vaccines to as many as 100 individual pathogens, then

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combine and refine them into one megavaccine. This phase is being done in collaboration with Dr. Rick Lyons at the University of New Mexico.

"I'm pretty sure we can accomplish the 'vaccine against anything' by scaling our system to develop 30 to 40 vaccine candidates a year. The other three goals may be tougher," said Johnston, holder of the Dr. Eugene Tragus Chair in Molecular Cardiology.

DARPA's mission is to take tough challenges and make them a reality. The agency, which developed the Internet, Stealth technology and microwave energy, helps develop innovative research ideas whose technological impact will go beyond demonstrated technical feasibility.

"DARPA has a very good reputation of being far thinking and being able to bring those ideas into reality a lot quicker than most people thought, and now they'd like to be able to do the same thing with the focus on anti-biological agent technology because of the concern of state or terrorist biological warfare," Johnston said. "They'd like to bring in such advanced technologies that it would make it very discouraging, if not impossible, for someone to mount a biological attack."

After the Gulf War, the Iraqi government admitted to running a large biological weapons program, which included weapons of botulinum toxin, anthrax, aflatoxin (which causes liver cancer) and other agents.

The threat of biological warfare is not solely a military issue because it also has been used as a tool of domestic terrorism. In March 1995, the Aum Shinrikyo religious cult released deadly sarin nerve gas in a Tokyo subway during rush hour, killing 12 persons and hospitalizing 5,000. It is believed that this group also has a sustained research effort to manufacture biological agents including ebola, anthrax and botulinum toxin.

In applying for the DARPA grant, Johnston said he imagined the future of vaccines and then wondered "how do we get there from here?"

The three-year project at UT Southwestern will be conducted from the Vaccine Identification Development and Assembly (VIDA) lab, where robotics, molecular biology and genetic immunization technology are combined to try to develop vaccines quickly. The lab

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already has contracted with human and animal vaccine manufacturers to develop new vaccines.

"Even though the main objective is to create these countermeasures for military personnel, the expectation is the things we develop will have immediate clinical application as well," Johnston said. "That's part of our motivation."

The United States unilaterally ended biological warfare research in 1969 and signed the Biological Warfare Convention in 1972. Now, only anti-biological warfare research is allowed.

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